

SOME OBSERVATIONS

In The

TREATMENT OF PNEUMONIA

With

SALICYLATE OF SODA.

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It is not my intention to enter, at any length, into a discussion upon general treatment, nor to dilate upon the various methods and plans to be adopted in combating complications; I mean to dwell simply upon the virtues of this one particular drug Salicylate of Soda as a therapeutic agent in Pneumonia, and I hope in the course of my paper to give indubitable evidence of its value and capabilities in this direction.

From the time of Loennec up to the middle or latter part of last century, Pneumonia was regarded and treated as an inflammation, by the knife in the old practice of blood-letting, by mercury and by innumerable antiphlogistics. Although at present we are craving after something new in the therapeutics of this disease, we must not altogether shun old-time practices. For example, the present-day physician is too apt to regard blood-letting as "prehistoric", but we must grant that there are certain cases which call for it, cases which but for the timely use of the lancet would undoubtedly prove fatal.

The disease being regarded as an inflammation has gained for it the term "Pneumonitis", but we have in addition to this a fever element present, the recognition of which has introduced into the

nomenclature the term "Lung Fever."

But while regarding pneumonia as a fever, we must not as an American author styles it "show a disposition toward therapeutic nihilism". Too many practitioners are apt to look upon it as a fever, comparable with Scarlatina, Small-pox, and other infectious diseases, and leave it to "run its course", employing only routine and symptomatic treatment.

This I consider far from sufficient. When we reflect for a moment upon the vast number of cases, which, after the resources of the physician have been tried to the utmost, so often prove fatal, it is then that we realize that something more than ordinary routine treatment is called for; and if there exist a drug capable of filling or even helping to fill that gap in therapeutics, every effort should be made towards its discovery. In this endeavour the burden should not fall only upon the few, but in it all should participate.

The treatment of pneumonia is not regarded in the text-books as one of the therapeutic uses of this valuable drug Salicylate of Soda. Being almost a specific in the treatment of Rheumatism, Rheumatic Fever, and allied diseases, its connection with such conditions and such conditions alone, is apt to dominate in the mind of the practitioner, and



its application in any other direction, if even for a moment entertained, is too readily shunned and ignored.

As an antipyretic it has been employed, and its value has certainly been appreciated in such fevers as scarlatina, typhoid, and indeed pneumonia, but in these as in other fevers, it has been used simply as an antipyretic, to aid in reducing a high temperature, and classed in this respect, along with quinine, phenacetin, acetanilid, and the like. As such I do not consider it to equal these; in fact, if hyperpyrexia were present, it would not be safe to rely upon any of these drugs, the external application of cold being by far the most speedy and certain remedy.

The advisability of administering antipyretics in pneumonia simply as such, is questionable. No benefit is derived from reducing a temperature if the general condition of the patient does not improve at the same time, so I should not vaunt the salicylates if their action depended merely upon their antipyretic properties.

Though my experience with this drug is as yet limited, still from the careful clinical study of each of my cases and from the results obtained, I am of opinion that the salicylates possess, apart from their antipyretic virtues, a still higher thera-

peutic value when employed in this disease. In this conviction I am not single. My opinion based entirely upon clinical observations may be fictitious; but when I show in detail, cases that have come under my charge treated by the Salicylates, even the sceptic in his criticism must admit that the results are more than mere coincidence.

The charts below not only show a successful termination in each case, but they also demonstrate to us the probable action of the drug. I say "Probable" because I have not yet investigated for myself the action of the Salicylates on Bacteria in general, nor on the "Diplococcus" in particular. But this we do know, that in Salicylic Acid we have a most powerful antiseptic and antiferment. Buchholz states that 0.15 per cent. of Salicylic Acid will prevent the development of bacteria in ordinary organic mixtures, and the influence of 0.005 per cent. (1 : 20,000) is plainly visible. Sodium Salicylate, he goes on to say, has about the same power.<sup>(1)</sup>

Let us consider now what is the probable action of the Salicylates in pneumonia.

In a very large percentage of cases of pneumonia there is to be found both in the lung and in the sputum as well, the "diplococcus pneumoniae" of Fraenkel. In the lung each air cell is the seat of

a colony of diplococci, which produce a poisonous albumen, termed pneumotoxin, the toxic effects of which, after entering the general circulation, soon become manifest.

According to the Klemperer brothers, this pneumotoxin plays an important part in bringing about the characteristic crisis. They aver that the diplococci continue to produce toxin until it assumes an antidotal action, (antipneumotoxin) which in its turn acts on the toxin already formed. Not until then, they say, does the crisis occur.

"Muir and Ritchie<sup>(2)</sup> in discussing this question state....."These considerations taken in connection with the fact that in man the pneumococci are usually confined to the lung, suggest that they may produce their general effects by means of toxins." Further they add, "We can say very little of the true nature of these toxins." That such do exist has been proved experimentally. The view held by the brothers Klemperer that the crisis depends upon the antitoxic action of the pneumotoxin, is feasible and may be perfectly true, but we shall notice shortly in what manner the crisis is affected by the Salicylates. We have in the pneumonic process diplococci increasing in numbers, the consequence being a gradual increase in the amount of toxin formed. Now, do the Salicylates act directly upon the germs



inhibiting their proliferation, or do they exert some antidotal action upon the toxins formed? This incurs bacteriological investigation, which I regret I have been unable to pursue; but from clinical observations, I am inclined to believe, that the growth of the diplococcus itself is affected thereby, and that possibly through some alteration in the quality of the culture medium.

Let us consider for a moment the condition of affairs in the diseased lung.

We have in the affected air-cell fibrin thrown out, which fibrin acts as a culture medium for the proliferation of the colony of diplococci contained within its walls. This is undoubtedly the ideal soil for the growth of the pneumonic germ, as is shown when we consider the fact that it is a delicate organism, and "most sensitive to its environment". When we attempt to cultivate it artificially, we meet with great difficulty in this direction, and even when successfully cultivated, it is found to live only for a very short period, not exceeding ten or twelve days at the most.

The medium has to resemble as closely as possible the original medium in the lung, otherwise the germ will not be developed, or if developed will

speedily die. This at once suggests the advisability and practicability of so altering the condition of the blood that the fibrin exuded into the air-cell may no longer prove a suitable medium for the growth of the diplococcus. Should Salicylate of Soda possess the power of so altering the quality of the culture medium, then its action is ideal. Having administered the drug upon this hypothesis, let us now consider in what form or condition it is present in the blood.

#### ITS CONDITION IN THE BLOOD.

Various theories are held regarding this, some believing that it exists there as the Sodium salt (Salkowski); others hold that it takes the form of an albuminate (Feser); while Binz believes that the Sodium salt is decomposed in the blood and acts there as Salicylic Acid. ("Pharmacy, Materia Medica and Therapeutics". Whittle). Then we have those who support the view that it prevents the production of Uric Acid in the system, the acid becoming changed into Salicyluric Acid (Latham). Dr Ferguson of Mine la Motte Mo;<sup>(3)</sup> says he was led to use the Salicylates in pneumonia under the conviction that inflammations in general were intensified by Uricacidoemia. He therefore shares with Latham the belief that the production of Uric Acid in the system is prevented by its use.



Mitchell Bruce<sup>(4)</sup> is of opinion that Salicylic Acid and Salicylate of Soda are identical in action, because the former is changed into the latter in the blood. A portion of it, he says, unites with Glycocine and forms Salicyluric Acid, but the Salicylate may possibly be acted upon by the free carbonic Acid of the plasma in inflamed parts of the body, thus liberating the acid again; so that in the blood we may have Salicylic, Salicylous, and Salicyluric Acids present.

Whatever may be its condition in the blood, acid or otherwise, we know this, that it reaches the seat of infection in the lung much better than if the disease were located in any other organ of the body. The organisms situated within the air-cells, naturally come into very close contact with the blood stream: so the sooner the condition of the blood is altered, the sooner will the fibrinous exudate be altered in quality. Then since the diplococcus is so sensitive to its environment, it may at once resent this alteration in its bed, and no longer thrive, the result being that from then its growth would be inhibited, and its life protracted. From clinical observation, I am inclined to believe that the Salicylates produce their effects in this way.

ITS EARLY ADMINISTRATION.

From my own experience, I certainly advocate the early administration of the drug, much better results being obtained than when employed after the toxins have got the upper hand. This too seems to point to the probable direct action of the Salicylates on the diplococci themselves, or to an action on the diplococci indirectly through the culture medium, and not to an antidotal action over the toxins.

I have only had one opportunity of commencing the administration of this drug late in the disease, and in that the beneficial effects were very slight; but while acting as an assistant in Lancashire, my chief on several occasions resorted to its use when the condition was well advanced, but without success. In these cases before the drug was started, the toxins already formed were well able to hold their own, proving their position impregnable, whereas in my own cases, I gave the drug at the very onset, and therein I consider lay the secret of my success.

When I consider my cases in detail it will be clearly shown by the charts how the fever in almost every instance was cut short. Not only was the duration of the fever lessened, but the pyrexia was kept in check, the drug appearing to exert a controlling effect over the fever process.

Dr Becker<sup>(5)</sup> who has had very good results with the Salicylates, eleven out of twelve cases having been rapidly cured, believes it to be a true preventative if given early. My experience is as yet too limited to enable me to speak with any certainty of its prophylactic virtues, but I certainly agree with Dr Becker in the advisability of its early administration.

#### ABSENCE OF CRISIS.

The question of crisis is a most important one, the beneficial effects of the Salicylates being especially evident in this direction. The text-books have it that a crisis occurring from about the fifth to the eighth day is the rule. Since I have ventured upon the Salicylate treatment, I can say that a crisis has not been the rule but rather the exception. In seven out of nine cases defervescence occurred by Lysis. (The effect upon the temperature throughout the process I shall discuss later).

How then can we account for this defervescence by Lysis? To answer this we must first consider what are the agencies supposed to bring about the characteristic crisis. Three theories are put forward regarding this.

The first is that the crisis is due to the stoppage of the supply of toxin. It is a known fact that a given quantity of a culture medium, can



remain a fit medium, harbouring and preserving the life of a given quantity of organisms only for a certain time. When the process runs its normal and natural course, the whole of the affected lobe becomes consolidated, and is virtually an enlarged culture medium. This remaining fertile as long as it can, at last becomes exhausted, and the organisms perish. With the death of the diplococci the production of toxin is arrested, and it is then that the crisis is said to occur.

I have already mentioned the theory of the brothers Klemperer - the production by the pneumotoxin of an antitoxin. They hold that this antitoxic element in the culture medium brings about the crisis.

There is still another theory, - the presence in the lung of a free acid inhibiting the growth of the diplococcus. This is said to be brought about normally and naturally in the following manner. In the blood there is normally present a certain amount of Bicarbonate of Soda. Nature brings about a chemical action with this, by the production in the parenchyma of the air cells, of an organic acid, termed "pneumic acid". This in contact with the blood liberates the carbonic acid gas which is then expired. When the air cells become plugged up the blood can no longer get access to it, as the capillaries also undergo a functional change, the result being that

pneumic acid is formed to excess. Now it is well known that the addition of an acid to a culture medium is fatal towards the pneumococcus, so that by the incursion of pneumic acid into the air cell the process becomes at once arrested, and the crisis occurs.

In this last theory the action brought about closely resembles the action or rather, I should say, the probable action wrought by the Salicylates.

In place of the pneumic acid acting upon the culture medium, we have the Salicylic, Salicylous, or Salicyluric acid supplied by the Salicylates, liberated as Mitchell Bruce proposes at the seat of inflammation. The process should not if possible be allowed to run on until the air cells have become plugged up, the reason for this being clearly shown when we quote the words of Andrew H. Smith, New York, on this subject. (6)

"It is true that to be fully effective, a germicide designed to act within the air cell must be employed before the circulation in the functional capillaries is arrested. After such arrest it can reach its destination only by the very narrow channel of the nutritive blood supply. But as the pressure of the exudate is the ultimate factor in closing the functional vessels (whatever coagulating influence the morbid process may have exerted) it is not until consolidation is complete that access through these

vessels is entirely cut off."

From this we deduce, that, the earlier the drug is given, the more effectual will be its action upon the exudate in the air cell, and the sooner will the quality of the culture medium be altered. With this early alteration in the quality of the exudate, the nidus will not prove suitable for the growth of the diplococcus, and the process will become arrested.

Germ proliferation will be inhibited then from the very onset, as also will be the production of toxin. Consequently, if the Salicylates be continued, the amount of toxin will be diminished day by day, such being represented by a gradual fall in the temperature. In this way we may account for the absence of the usual and characteristic crisis.

#### SALICYLATE A TRUE PREVENTATIVE.

It almost stands to reason, that if this be the true action of the Salicylates, the drug is, as Dr Becker ventures to say, an actual preventative; and I have every reason to believe that, if, in an epidemic of what we now recognise as "post-influenzic pneumonia", Salicylate of Soda be the agent employed in the treatment of the primary influenza, the liability to pneumonia would be decidedly diminished. I cannot, however, as I have already stated, speak with any certainty of its prophylactic virtues, my experience being as yet too limited.



RELAPSE.

Liegel, <sup>(7)</sup> in relating his experience with the drug, mentions that when he first commenced its use, he suspended the salicylates immediately the temperature became normal; but he soon found that in a number of cases this was followed by a relapse. The reason of this relapse I should attribute to the fact that the blood devoid of Salicylic acid had no longer an effect upon the medium, consequently what few organisms there were still vital, had a fresh opportunity of once more proliferating and of producing toxin. I noticed this relapse in two of my cases. The first was in the case of a child six years of age, in fact this was the first case in which I employed the drug. Not being certain of the dosage the child could stand, I rather erred on the safe side. The temperature came down the first day from 103°F. to about 100°F., remained about that for the next two days, but on the fourth day it ran up again to almost 103°F. I doubled the amount of Salicylate and the temperature two days later was down to normal.

The next case was that of a girl seven years of age. The temperature commenced to fall on the third day, and on the fifth was normal. I stopped the Salicylate on the following day, and on the eighth day, it rose again to 100°F. I at once resumed the Salicylates, and the temperature came down gradually,

reaching the normal on the eleventh day. I now make it a rule to continue the drug for three or four days after the normal has been reached, and since doing so, no case has relapsed.

#### DURATION OF THE FEVER.

Authorities seem to differ widely in the reply to the following question:-

"Can the duration of the fever process be influenced at all by medicinal agents?" Professor Osler<sup>(8)</sup> appears to be very decided upon this point. He says "Pneumonia is a self-limited disease, and runs its course uninfluenced in any way by medicine. It can neither be aborted nor cut short by any known means at our command. Even under the most unfavourable circumstances it will terminate abruptly and naturally without a dose of medicine having been administered." (Principles and Practice of Medicine).

Such a reply coming from an author of such high repute, would appear at first to be decisive. But when we consult Bristow<sup>(9)</sup> we find that he believes that "in very mild cases, all the symptoms may subside in three days or even two days." Let us then go further and consult Liegel whose experience with the Salicylates is very extensive. He reports a successful termination in seventy-two consecutive cases of Croupous Pneumonia, and in addition states that the duration of the attack was diminished one

half, the temperature, which commenced to fall at the end of the first day, reaching the normal about the third or fourth day. It may be presumption on my part to deny Professor Osler's statement, but I am convinced, that it is possible for the Salicylates, if given early, to abort the pneumonic process and cut the fever short. In almost all my cases the temperature had reached the normal by about the fourth or the morning of the fifth day.

#### THE COURSE OF THE FEVER.

To the above one may answer with the interrogation, Is this early fall in the temperature synchronous with an abating of the pneumonic process, or is this fall merely wrought by the antipyretic power of the drug, thus tending to deceive the observer? To this my reply is that in all my cases, I have noticed general improvement go hand in hand with the subsidence of the fever.

As a rule I did not notice an immediate fall, but generally on the third day the temperature commenced to come down. Although there was seldom an immediate fall on administering the Salicylates, still in no instance was there a perceptible rise, the temperature generally remaining the same or varying less than a degree for one two or three days.

The following case, however, was one in which the fall in temperature was not concurrent with general improvement.



A boy, sixteen years of age, had been under my observation for several weeks suffering from incipient Phthisis. The physical signs were at first scarcely perceptible, but the dry hacking cough and the family history pointed in all probability to the nature of his complaint. While out one day in the country, he got a severe wetting and a typical croupous pneumonia ensued. The firm, tenaceous and rust coloured sputum showed on microscopical examination the presence both of the diplococcus pneumoniae, and a few tubercle bacilli. I gave him fifteen grain doses of Salicylate of Soda every four hours, and on the second day, the temperature commenced to fall. Defervescence was by lysis, the temperature reaching the normal on the fifth day and remaining so throughout the following day. I stopped the Salicylate because of great restlessness and an inclination to delirium, giving instead hypnotics and hypodermic injections of strychnine. The temperature, however, began to rise again. I pushed the Salicylates giving as well heart tonics and creosote, but it was of no avail. The temperature gradually rose higher and higher until he succumbed on the eleventh day of the illness.

On examining the sputum towards the later stages of the process, I found Tubercle Bacilli in large numbers.

Never having seen a case of what is called "Acute tuberculo-pneumonic Phthisis" this may be class-  
ed as such. But the disease commencing as a typical croupous pneumonia, and terminating with an acute tuberculous character, and having apparently been influenced by the Salicylates, before the tubercle bacilli took command of the position, is worthy of note, and can hardly be classed as an exception to the rule in my other results.

I maintain then that Salicylate of Soda by so influencing the culture medium in the air cells, exerts a controlling effect over the fever, preventing if given early, the occurrence of undue high pyrexia. It has not merely an inhibitory action upon the fever, per se, but the whole pneumonic process shares in the benefit derived from its administration.

#### THE PHYSICAL SIGNS.

If the duration and course of the fever be materially affected by the Salicylates, one would naturally expect the physical signs to be limited in a like manner; and this we do find. In stead of the disease proceeding to the extent of absolute dulness on percussion, a condition indicating the "second stage", I have invariably observed considerable modification in the percussion note. And so with the bronchial breathing, vocal resonance, and fremitus;

All are alike diminished in intensity. Then since the salicylates are capable of so restricting the disease process, the third stage, "resolution", will not be so prolonged as usual, there being less exudate to resolve; in fact the condition of affairs is the same as when the disease aborts of its own accord.

#### EFFECT UPON THE SPUTUM.

The great difficulty experienced by pneumonic patients in getting rid of that viscid and tenacious material, so characteristic of this disease, leads us at once to endeavour to render them aid in this direction. Expectorants containing Ipecacuanha, Squills, etc., may here be given, but I have found in the Salicylates a property which in itself would almost be sufficient to merit the drug as a therapeutic agent in pneumonia. It appears to materially alter the condition of the sputum from its characteristic firm and viscid nature, to a more liquid state, it becomes in fact, catarrhal in nature.

When I first observed this change, I was rather alarmed, fearing that the process was about to assume a low type, wherein the sputum becomes very profuse, liquid and high coloured. But I was surprised to see what great relief the patients experienced when the condition of the sputum was so altered.



ed, as to greatly facilitate the act of expectoration.

#### ITS ACTION ON THE HEART.

Although death in pneumonia may occur either from the virulence of the infection, - a general toxæmia setting in, - or from interference with respiration, there is still another cause capable of bringing about a fatal issue, and that is "heart failure". Death from "asystole" is, I think, more apt to occur than death from "asphyxia" although Plicque<sup>(10)</sup> declares that asphyxia brought on from loss of respiratory surface, accounts for nine deaths for every one dying from the infection. The heart, however, is the organ one watches most carefully when treating a case of pneumonia, and certainly it deserves all the attention that can be bestowed upon it.

The heart may be attacked directly by the toxins paralysing its action, or death may result from actual failure.

In this latter condition, we notice post-mortem that the Right heart is distended and the wall weakened. If the fever be long continued, the heart muscle undergoes cloudy swelling, which, rendering the walls weak, favours dilatation and consequent failure. But if the fever be of short duration,

more especially if the duration be only four or five days, as has occurred in almost all my cases, and in those reported by Liegel and others, the chances of such mural heart changes taking place are reduced to a minimum.

No doubt there are many objectors to the employment of Salicylate of Soda in pneumonia, on the grounds of its depressant action upon the heart.

As it is the rule rather than the exception for authorities to differ upon many questions in medicine, so we find opinions differing widely on this one point.

This subject having been quite recently discussed in the "British Medical Journal", some extracts from this paper may here prove of interest. The manufacturing chemist would appear by some to be to a great extent responsible for the existing differences of opinion regarding this question. Dr. P. O'Connell<sup>(11)</sup> in a reply to the query, "Is Sodium Salicylate depressing?" says, "Yes, if the acid employed be the synthetic variety (made from carbolic acid). If Salicylic Acid made from oil of wintergreen be employed, the drug is safe." He adds that he never saw any depressing action result from the use of the pure drug.

H. Hilton Heffernan<sup>(12)</sup> reports a case of poisoning with 130 grains of Salicylate of Soda. He remarks upon the absence of depression.

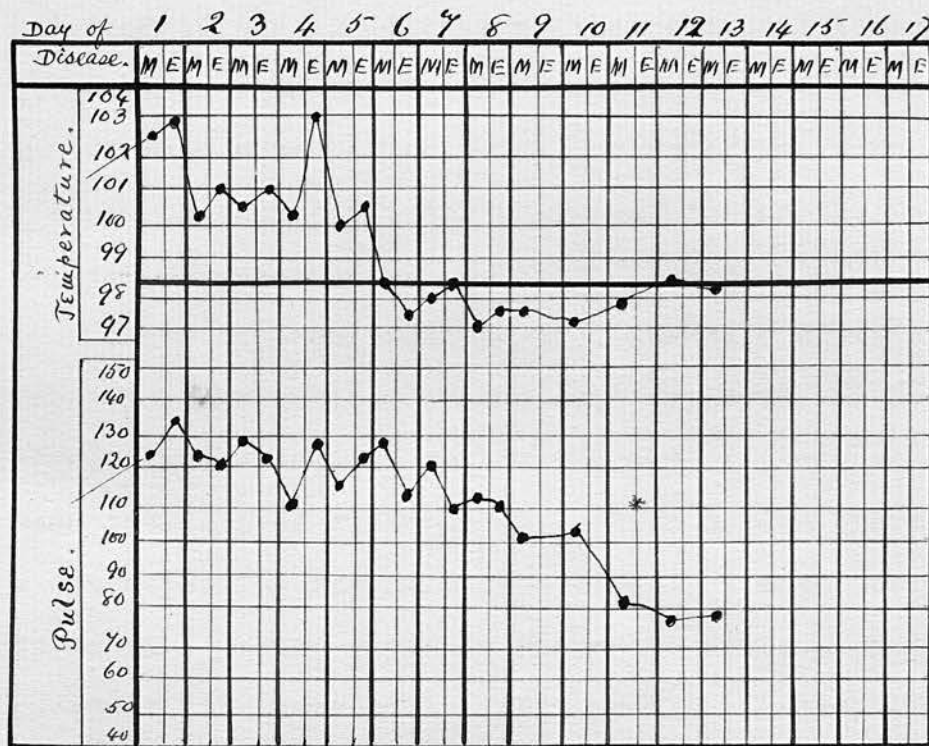
Gordon Sharp M.D.<sup>(13)</sup> in the same periodical says, "Somehow it has crept into text-books that Sodium Salicylate is a depressing agent. Now, I hold that the Salicylate within reasonable limits is not a cardiac depressant, but on the contrary is often a calmative of the greatest usefulness."

Only in one case have I noticed marked heart depression to result from the use of the Salicylates, and that was in a very ill-nourished child. This, too, happened to be the first case in which I employed this drug. This, I have already made reference to when dealing with the question of "relapse" after the too early suspending of the drug.

Instead of the pulse rate slowing and steadying down it remained rapid, feeble, and intermittent. The pulse line in the chart below shews a great contrast to the line representing the pulse in my other cases, in which there is shown a decided decline synchronous with the fall in the temperature.

It will be noticed that even when the temperature was down as low as 97°F., and practically remaining there for five days; the pulse remained very rapid, over 100 per minute; and after stopping the Salicylate it gradually regained its strength, returning also to its normal rate and regularity.





No. 1.

Although this is a case of Undoubted heart-depression in pneumonia possibly exaggerated by the use of the Salicylates, still it is the exception rather than the rule. No doubt if the drug were given over a long period in ten or fifteen grain doses every four hours, depression would result. This I have noticed to occur in long illnesses from Rheumatic fever; and in this respect, I can speak from experience with the drug on my own person. But given for so short a period as a week or ten days at the most, with the above exception, I have never noticed any ill effects.

Should a case occur, however, in which the circulation is easily depressed, then the addition of Strychnine, with small and frequent doses of brandy, and perhaps some coffee, will generally be found sufficient to counteract any depressant action the Salicylates may exert.

There is much truth in Dr O'Connell's statement regarding the quality of the acid employed, no bad effects being seen to follow the use of the pure drug made from oil of wintergreen. With Gordon Sharp's views regarding its calmative effect, I most decidedly concur. When given in Rheumatic Fever I am assured of its beneficial effect upon the heart, provided always it is not continued too long. It slows and quietens the heart's action, when given in moderation, so lessening the tendency to valvular disease. I do not for a moment suppose that it prevents valvular disease, but by the slowing of the heart's action, the blood current passes more quietly over the valve surfaces, friction and irritation being thereby considerably diminished.

So in pneumonia we notice a decided slowing of the pulse, as may be seen by glancing over the charts below. Not immediately after administration, but usually on the second or third day did the pulse rate begin to decrease.

Since writing this paper, I have been informed of a suitable method by which the nauseous taste of the Salicylates can be very effectually covered, and that is by the addition of Simple Syrup and Cinnamon water - Certainly such a combination is better than adding Gentian as far as taste is concerned -

A.H.W.



Mitchell Bruce<sup>(14)</sup> claims that a moderate dose causes increased cardiac action, and with larger doses the heart is depressed after the primary excitation, the vessels are relaxed and the blood pressure falls (Materia Medica and Therapeutics) and yet in these cases of poisoning with the very large doses mentioned above, no depression was observed.

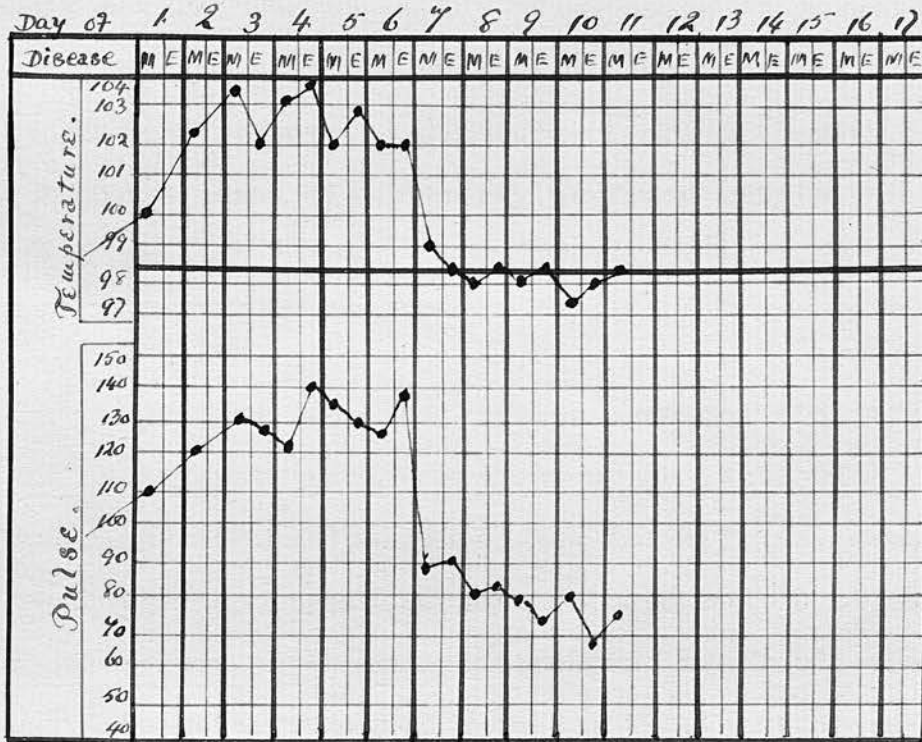
My opinion then is that the depression caused by the Salicylates is so slight that it may be disregarded altogether, unless the subject be already suffering from cardiac disease, or extreme weakness, in which case heart stimulation must be the first consideration, the old maxim "sine pulsu, nulla therapeia" being then foremost in our thoughts.

#### OBJECTIONS TO ITS USE.

##### 1. Its nauseating effect.

Salicylate of Soda, per se, is undoubtedly nauseating, some patients exhibiting quite an idiosyncrasy in this direction. To not a few stomachs is its unpleasant sweetness repellant, a difficulty in its administration being thereby encountered. This difficulty, however, can I think be surmounted if the following combination be employed, aromatic spirits of Ammonia in ten or fifteen minim doses for an adult, with the addition of infusion of Gentian. This renders the drug much more palatable, the ammonia at the same time exerting a tonic or stimulating influence on the heart. Only in one case out of ten

did I encounter any difficulty in its administration. This was a girl aged 21 years. I put her on ten grain doses of Salicylate of Soda in the form referred to above, but this was rejected.



### No. 2.

The next dose I diluted, but this also was rejected. Then I reduced the dose to five grains, with a similar result. I then suspended the Salicylates, giving instead Carbonate of Ammonia, Strychnine, etc. It is interesting to note the chart of this case. The drug was withdrawn after the first day with a result which contrasts markedly with my other cases in which the drug was tolerated.

## 2. DIARRHOEA.

The liability to diarrhoea following the use of the Salicylates, exhibited by not a few patients, is certainly a worthy objection. As it so happened, this never occurred in any of my cases of pneumonia, but I have noticed it when employing the drug in other derangements. Tincture of opium in five or ten minim doses will usually be found sufficient to check the diarrhoea.

## 3. SWEATING.

Objectors lay great stress upon the discomfort and unpleasantness experienced by patients when under the administration of the Salicylates, caused by their diaphoretic action. Those who do object to their use on these grounds, are invariably those who have never ventured upon the treatment of pneumonia with this drug. With ten grain doses every four hours there is not produced that profuse diaphoresis, noticed when double that quantity is given, as is the rule at the commencement of Rheumatic Fever. My pneumonic patients have never expressed discomfort in this direction, either to me or to the nurse in attendance.

## 4. DEPRESSANT ACTION ON THE HEART.

This question I have already discussed, and all I can add here is, that in my opinion, its depressant



action is not sufficient to warrant its condemnation as a therapeutic agent in pneumonia.

#### 5. CHINCHONISM.

The tendency to tinnitus, deafness, etc., I find materially lessened by the addition of the aromatic spirits of Ammonia, just as Hydrobromic Acid seems to prevent to a great extent the unpleasant head symptoms, produced by Quinine. This, in itself then can hardly be regarded as an objection to the employment of the drug.

#### SOME CASES ILLUSTRATIVE OF SALICYLATE TREATMENT.

In reviewing the following cases my object will be to discuss them simply in relation to treatment; the drug in each instance being administered in ten grain doses every four hours for an adult, and four or five grain doses for a child, with aromatic spirits of Ammonia, and Gentian. In one case where the temperature at the onset ran up to 104°F. I employed cold sponging as well.

Let me mention en passant, that in no case did I resort to the "poultice", but instead, the whole chest was swathed in a jacket of gamgee tissue.

Where pain at the onset was severe, I applied a mustard leaf, if localised, and especially where pleural friction was observed, and a hypodermic injection of morphia where the pain was more general in character.

CASE I.

I have already made reference to the first case in which I employed this drug, the chart of which appears on page 23 . In glancing again at this chart, there is nothing very striking to be observed in the behaviour of the temperature; but on the second day of the fever, which was the first day the child had the Salicylates, the temperature fell considerably and remained so for two days. On the temperature again rising on the fifth day, I doubled the dosage, the following morning showing a decided change for the better, although the temperature was not down until the seventh day.

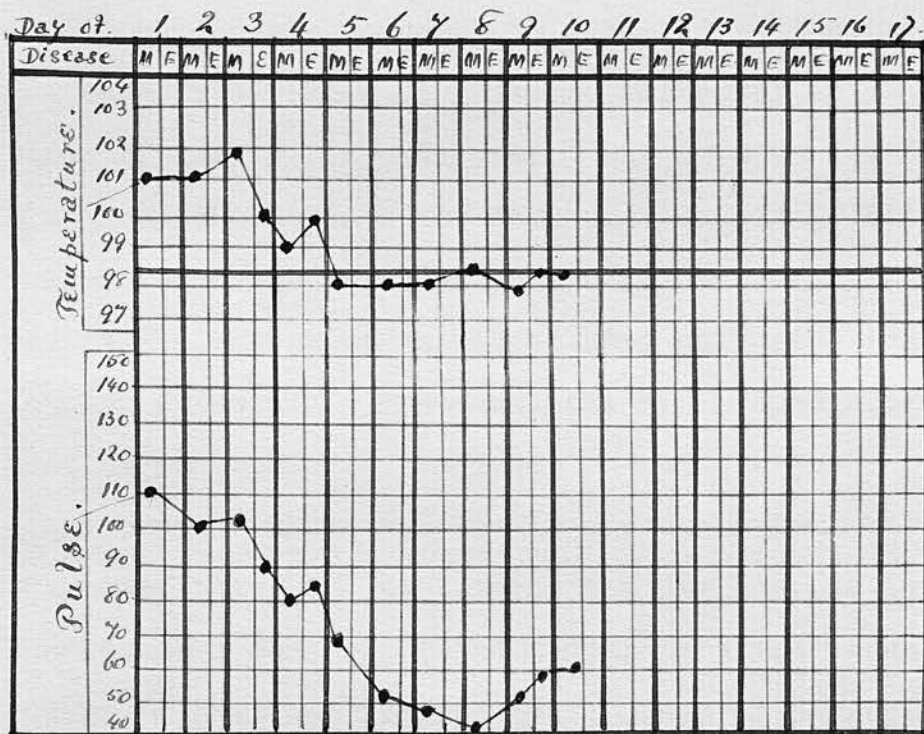
Impressed with the behaviour of the case under Salicylate of Soda, I resolved to make further investigations as to its capabilities in the treatment of this disease, and I was soon afforded that opportunity in the following case.

CASE II.

I was sent for one evening to see A.B., 21 years of age, a weaver by trade. On examination, the symptoms pointed to a commencing croupous pneumonia in the upper lobe of the left lung. There was severe pain in the left side which I relieved with a mustard leaf and as well a hypodermic injection of morphia. The expectoration was scanty, but tenaceous, and of characteristic colour. Micro-

scopic examination of the sputum revealed the presence of the diplococcus. I made no cultures. The urine showed almost complete absence of chlorides. Of the value of this sign, either as a diagnostic or prognostic, I am inclined to be dubious. I found it too variable to be relied upon.

I at once started treatment in this case by giving the drug in ten grain doses every four hours. The temperature was then  $101^{\circ}\text{F}$ . and pulse 110, the following morning showing the temperature the same and the pulse 100.



No. 3.

On the third morning the temperature rose to  $101.8^{\circ}\text{F}$ . falling to  $100^{\circ}\text{F}$ . that evening and followed by a



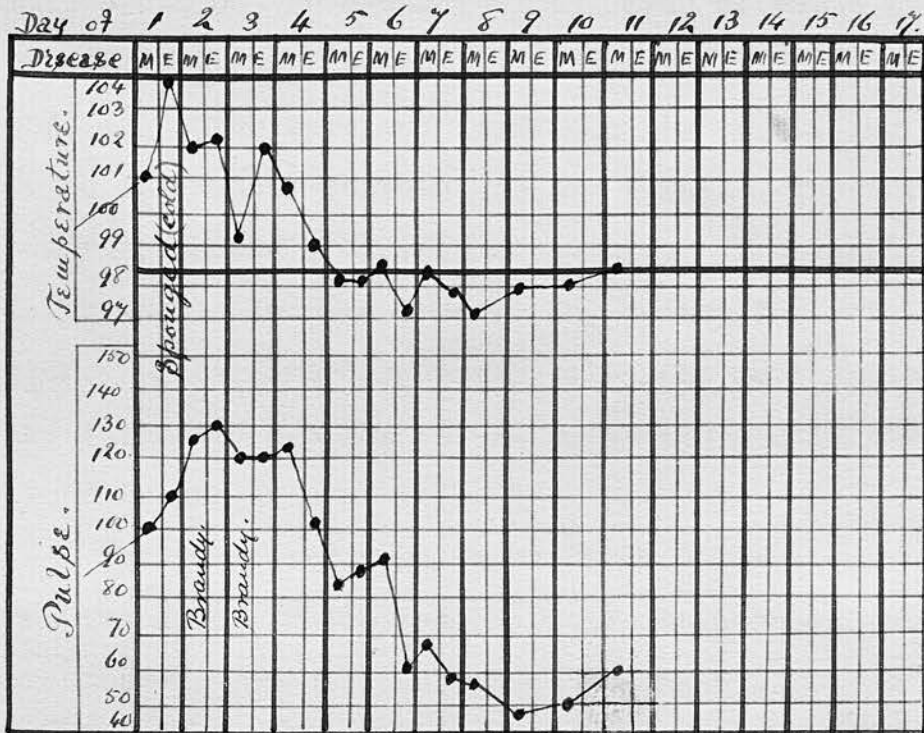
fall the next day to 99°F. Rising to 100° F. in the evening it came down to normal on the morning of the fifth day and remained so.

Signs of improvement were noted on the third day and he rapidly convalesced after that. The pulse rate as can be noticed from the chart fell gradually after the first day. The fever then in this case was broken on the third day, resolution commencing at the same time, the duration of the fever process being only four days.

### CASE III.

Considerable interest is attached to the following case, from the fact that the father of this patient, (Mrs W., age 31 years) was said to have died from pneumonia a few days previous to my being called in to see her; and her boy, six years of age, was at the same time as his mother, suffering from a lobular pneumonia. On examination, I found a commencing pneumonia in the lower and middle lobes of the Right lung. There was little expectoration, but characteristic, and containing the diplococcus in considerable numbers. The temperature was then 101°F. I gave her fifteen grain doses of Salicylate as above, but throughout the day she rejected this, the stomach having been previously deranged, possibly through the over-frequent libations partaken during the funeral proceedings. The patient was rather alcoholic.

On calling in the evening, I found the temperature 104°F., but she was now able to take the medicine diluted. The pulse, however, was only 110 and fairly good, so I did not fear this initial rise. Still I ordered her to be sponged down, and the following morning the temperature was down to 102°F. remaining about that throughout the day. On the third day it fell to 99°F. to rise again that even-



NO. 4,

ing to 102°F.; but after this it came down gradually, as is seen by the chart above, when two days later it was normal. Expectoration, on the third day, was catarrhal in character and profuse, diminishing quickly after that. On the second and third day, the circulation was rather depressed, so a little brandy was administered. I do not think

this depression was at all associated with the Salicylates, as, on the following day the heart was much stronger, and more regular, continuing to improve from that date onwards.

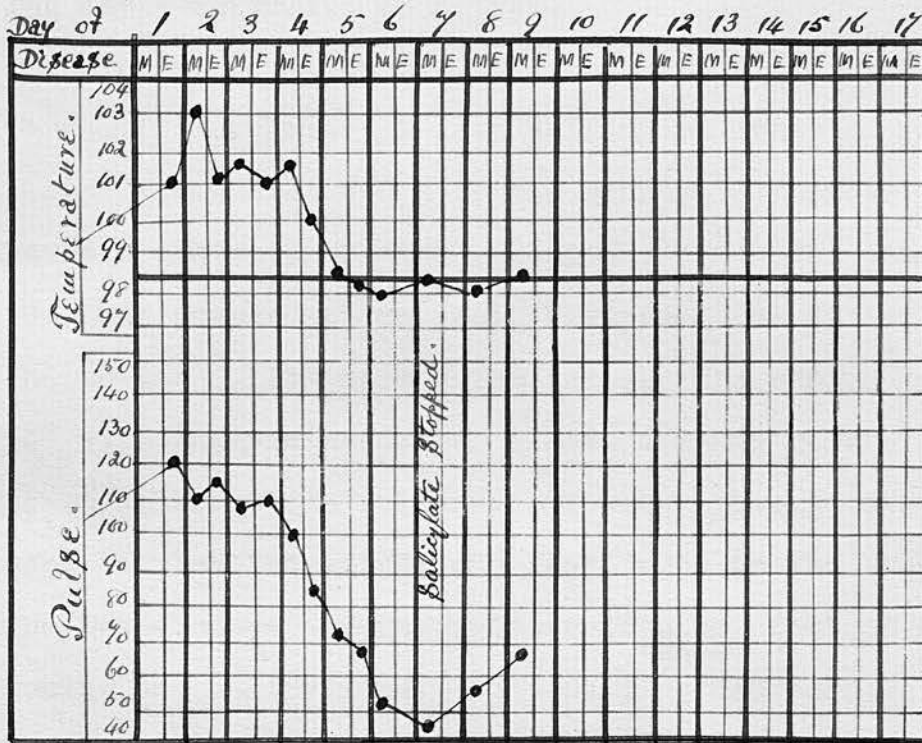
#### CASE IV.

The next case I shall review is that of R.S., age 21 years, occupation a weaver. I was called out to see him on the evening of the 29th of March 1900. On examination, I suspected pneumonia, although the physical signs were not sufficiently marked for me to be absolutely sanguine on the point. The urine however, showed a diminished quantity of chlorides. I was unable then to procure any sputum for examination. I commenced, however, with the Salicylates, the temperature being 101°F. pulse 120 and respirations 30 per minute.

The following morning my diagnosis was confirmed, and the sputum which was characteristic showed the presence of the diplococcus of pneumonia.

The temperature was now 103°F. and the pulse 110 and fairly strong. The temperature varied very little until the fourth day when it fell that evening to 100°F., the following day showing it normal. The fever process in this case lasted only four days. By the third day the sputum had assumed a catarrhal character, diminishing speedily in quantity after that. The Salicylate was continued for three days



NO. 5.

after the normal was reached no relapse resulting.

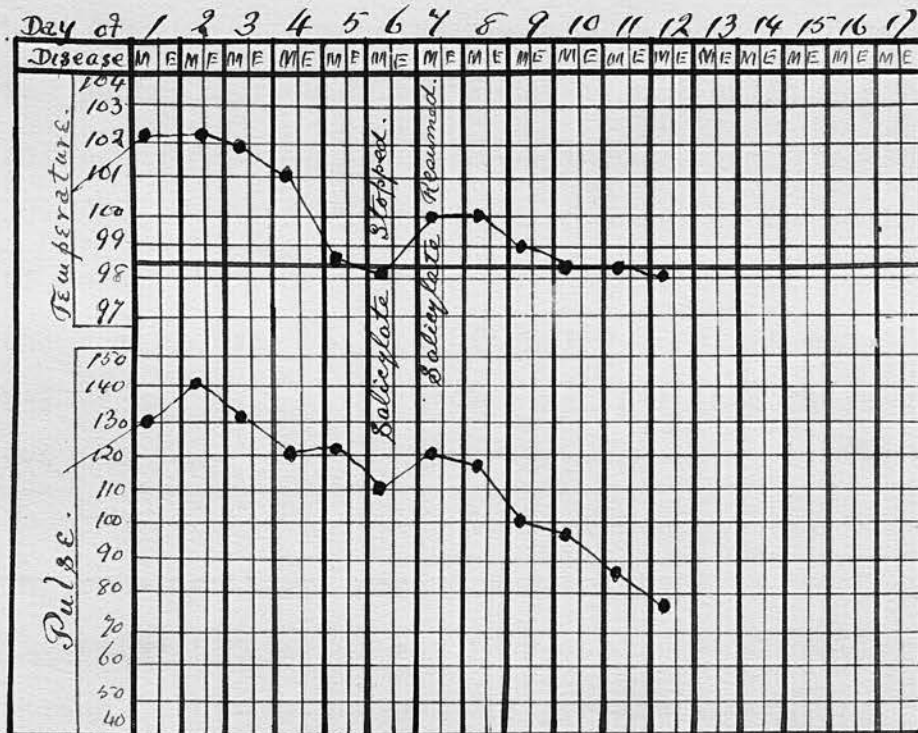
CASE V.

M.H., a child six years of age, had an attack of pneumonia, at the age of four, the same lung being affected in this illness. When I first saw her the temperature was 102.4°F. and pulse 130; the day before, I was informed she had a severe rigor. There was slight dulness on percussion, and the sputum was scanty, viscid and blood stained.

I at once put her on 5 grain doses of Salicylate of Soda every four hours, and on the third day she commenced to improve, the temperature falling on the morning of the fourth day to 101° F., and the follow-

ing day practically to normal.

The pulse meanwhile was small and rapid, though perfectly regular. I gave half minim doses of Liquor Strychniae and a little brandy to improve the heart's action. On the second day after the temperature had reached the normal, I stopped the Salicylates and on the following day the temperature ran up to 100°F. This coincidence, I have already referred to in dealing with relapse. I was unable to discern the involvement of any fresh area in the lung. The temperature and the pulse-rate also, fell on resuming the Salicylates. The cardiac depression



No. 6.

noticeable throughout this case, I do not consider due to the Salicylates, as the pulse improved immediately

the drug was resumed.

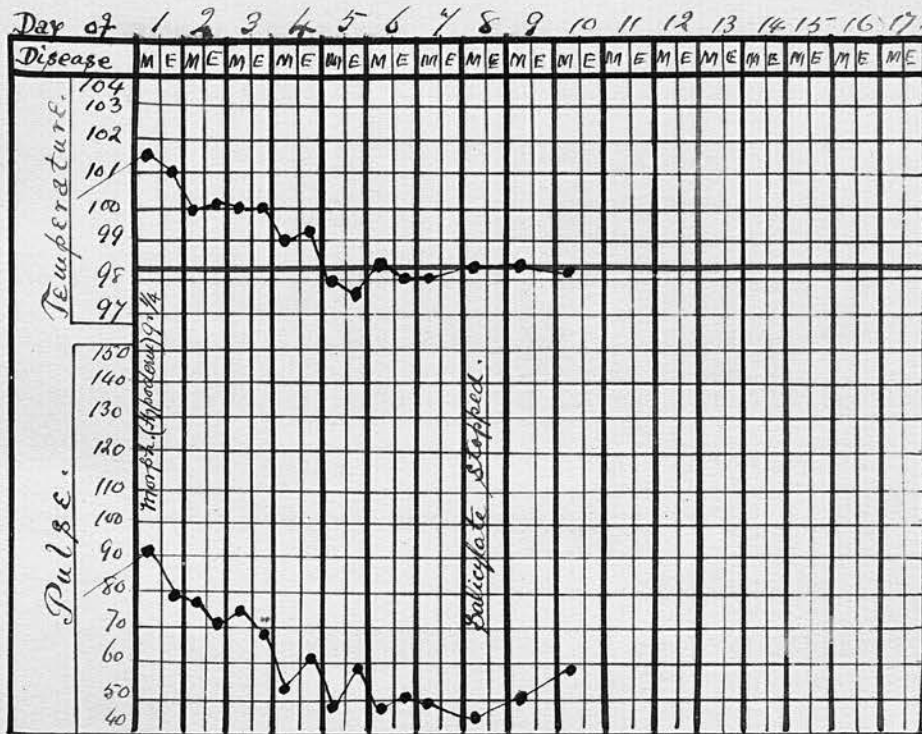
I was unable in this case to record the evening temperature the child's mother being foolishly averse to the attendance of a district nurse.

#### CASE VI.

A.W. a "coachman", age 27 years, I found suffering from a commencing croupous pneumonia, the lower lobe of the Right lung being the part involved. He was a strong and heavily built man, not given to over-indulgence in alcohol. When I first saw him his temperature was 101.4°F., pulse 82 and respirations 28. He complained of a good deal of pain, which I relieved with a hypodermic injection of morphia. The sputum was thick but scanty; not until the following day was it blood-stained.

I commenced with ten grain doses of Salicylate of Soda every three hours, and the same evening the temperature was down to 101°F., on the second day it had fallen to 100°F., and remained there until the fourth day, when it fell to 99°F. That evening it rose a little to 99.4°F., but the following morning it was normal and remained so. The pulse throughout was very good, quite regular and strong. The sputum was not profuse; becoming catarrhal on the third day, expectoration appeared to be facilitated, and he experienced very little inconvenience in that direction.





## NO. 7.

With regards the above case, the process was practically terminated by the morning of the fifth day. Not only was the temperature down, but resolution was well advanced by that date.

The Salicylates, given for the first three days in ten grain doses every three hours, and reduced to every four hours for the next three days, had absolutely no deleterious effect upon the condition of the heart, the pulse remaining well sustained throughout.

CASE VIII.

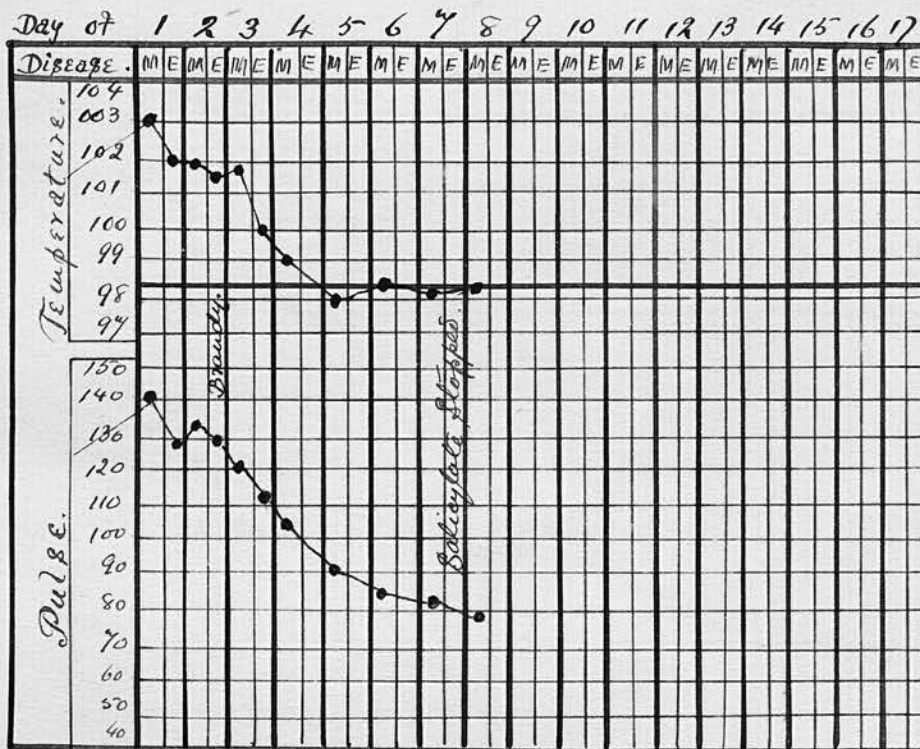
Another example of the Salicylate treatment is found in the case of a child, seven years of age, whom I was called in to see quite recently.

Her mother said she seemed poorly and "shivery" the day before. She had a short dry cough, with a temperature of 103°F. pulse 140, and respirations 30.

Being rather handicapped in my examination of the child, I failed to detect that fine crepitation so characteristic of the first stage of pneumonia. Having suffered from pneumonia a few years before, and from her general condition my suspicions were naturally aroused.

On examining the urine, I found marked diminution in the quantity of chlorides.

I put her on five grain doses of Salicylate of Soda every three hours, and that evening the temperature had already fallen a degree. On the following day, I made out distinct crepitations and slight dullness over the lower lobe of the left lung. The child was now breathing very rapidly, the temperature remaining at 102°F. and the pulse 136, small and irregular. The left cheek showed a decided blush. Here I ordered her a teaspoonful of brandy every four hours. On the evening of the third day of the disease, the temperature had fallen to 100° F., the next morning to 99°F. and on the fifth day to normal, the pulse improving at the same time.



NO. 8,

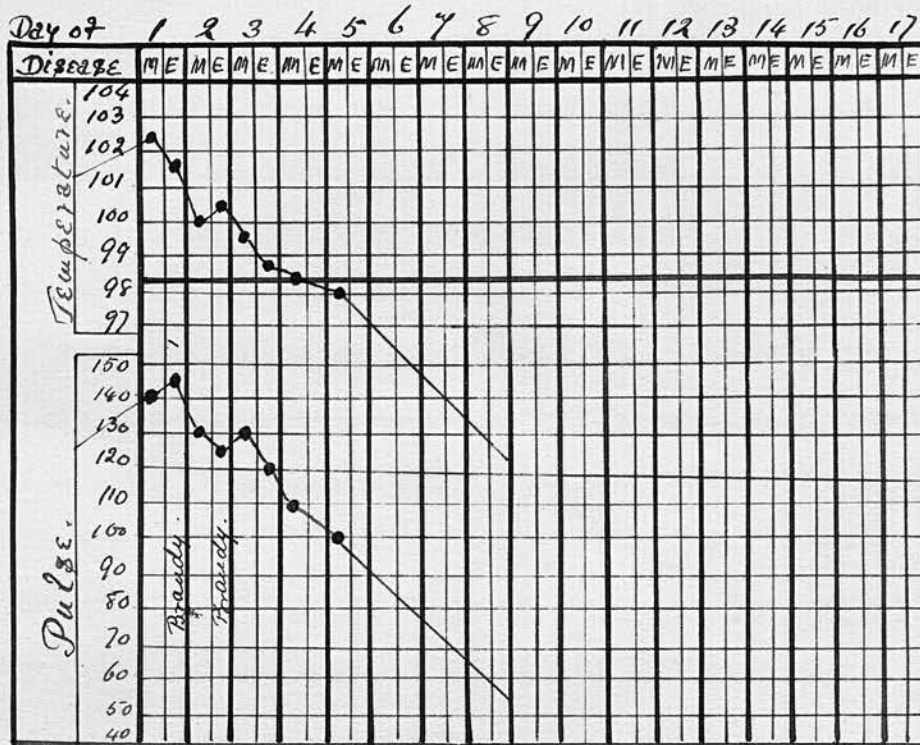
Incontinued the Salicylates for other two days, the result proving most satisfactory. The pulse in this instance steadily improved during the administration of the drug, notwithstanding the fact that the child was taking 40 grains of Salicylate of Soda in the 24 hours, and that for seven days.

Whilst writing this, I am at present in attendance on the following case.

CASE VIII.

Just five days ago, I was called in to see a child seven years of age, whom I found suffering from a croupous pneumonia in the upper lobe of the





NO. 9,

left lung. Fine crepitations and slight dulness were elicited over the whole of that area. His mother had noticed him ill for two days before this. The temperature was  $102.2^{\circ}$  F., when I first saw him. Five grain doses of Salicylate of Soda were given every four hours, and that evening the temperature was  $101.6^{\circ}$  F.

The pulse was rapid and small. I gave him a little brandy and went on with the Salicylates.

Next morning the temperature was  $100^{\circ}$  F. and as

will be seen by the chart, was normal on the fourth day, and normal also on the fifth day.

The above results, though limited, are at least most satisfactory, and encouraging. Out of ten cases of pneumonia, both croupous and lobular, in which I have employed the Salicylates, only two have proved fatal. One of these two I have mentioned in my paper; the other fatal case was a highly neurotic woman who succumbed suddenly while sitting up in bed to cough. In this latter case convalescence had started, but the sudden change from the recumbent to the erect position proved too much for her feeble and nervous heart, asystole being the result.

#### CONCLUDING REMARKS.

As to the exact mode of action of Salicylate of Soda in Pneumonia, I cannot speak with certainty. Whether it acts upon the germ directly or indirectly through alteration in the quality of the culture medium necessitates further investigation.

But I am of opinion that in the Salicylates we have a most valuable therapeutic agent, its value in pneumonia being greatly enhanced by its early administration; and I am convinced that by its use, pyrexia can be controlled, the duration of the attack materially lessened, collapse from crisis obviated, and above all many lives saved.

It will be my earnest endeavour to continue to make further and fuller observations with the use of this drug, and I sincerely hope that my results in future will be as gratifying and encouraging as they have been since venturing upon this mode of treatment.



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Valuable information on this subject I have obtained from that contribution on "Lobar Pneumonia" by Andrew H. Smith, M.D., New York, in the Twentieth Century Practice of Medicine, Vol. XVI.